

Monthly Marine Biotoxin Report

September 2011

Technical Report No. 11-23

INTRODUCTION:

This report provides a summary of biotoxin activity for the month of September, 2011. Ranges of toxin concentrations are provided for the paralytic shellfish poisoning (PSP) toxins and for domoic acid (DA). Estimates are also provided for the distribution and relative abundance of *Alexandrium*, the dinoflagellate that produces PSP toxins, and *Pseudo-nitzschia*, the diatom that produces domoic acid. Summary information is also provided for any quarantine or health advisory that was in effect during the reporting period.

Please note the following conventions for the phytoplankton and shellfish biotoxin distribution maps: (i) All estimates for phytoplankton relative abundance are qualitative, based on sampling effort and percent composition; (ii) All toxin data are for mussel samples, unless otherwise noted; (iii) All samples are assayed for PSP toxins; DA analyses are performed as needed (i.e., on the basis of detected blooms of the diatoms that produce DA); (iv) Please refer to the appropriate figure key for an explanation of the symbols used on the maps.

Southern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed in very low numbers at several sites in September (Figure 1). PSP toxins were not detected in any shellfish samples this month (Figure 3).

Domoic Acid

Pseudo-nitzschia was observed along the entire southern California coast in September
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Figure 1. Distribution of toxin-producing phytoplankton in Southern California during September, 2011.

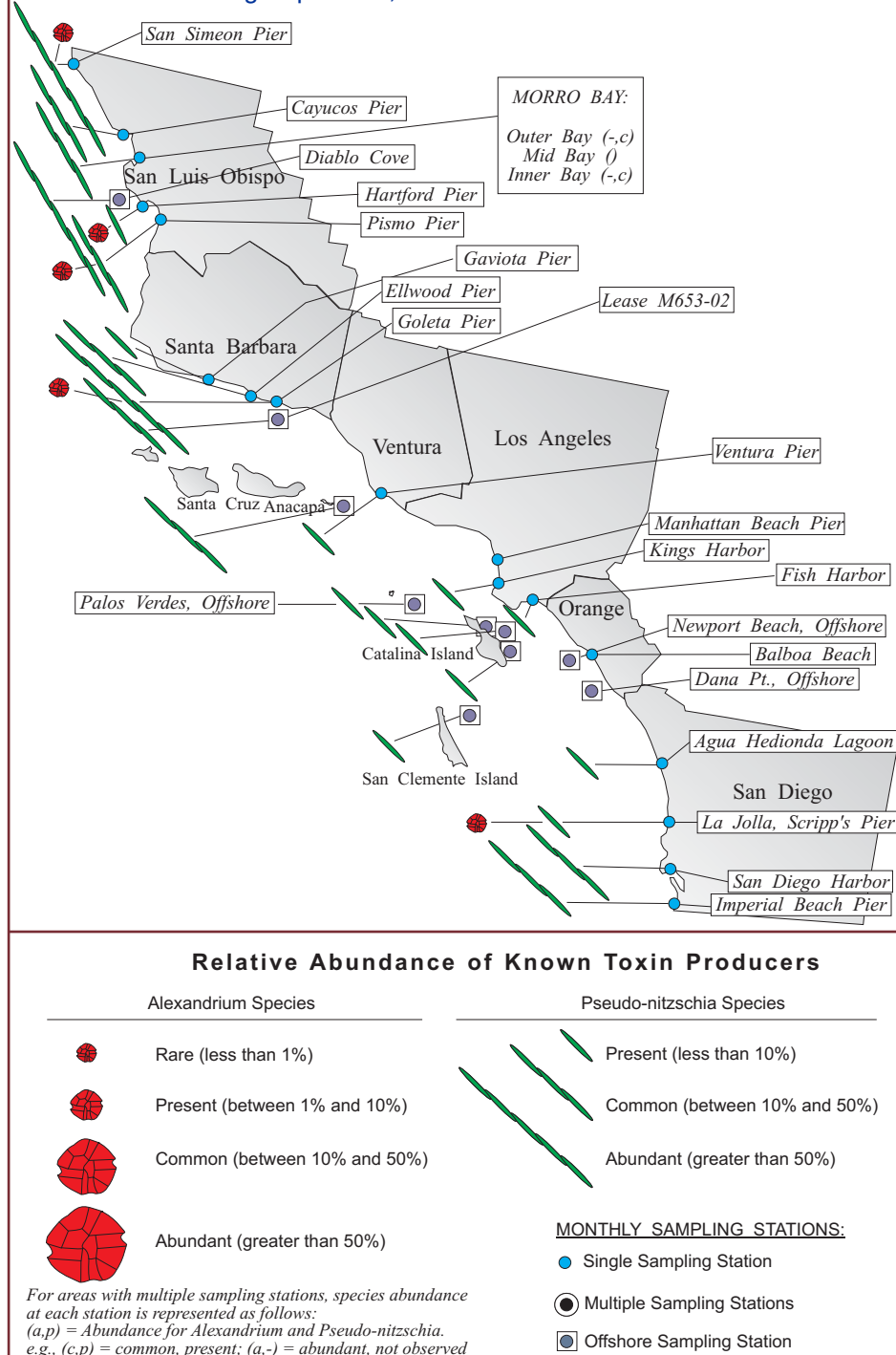
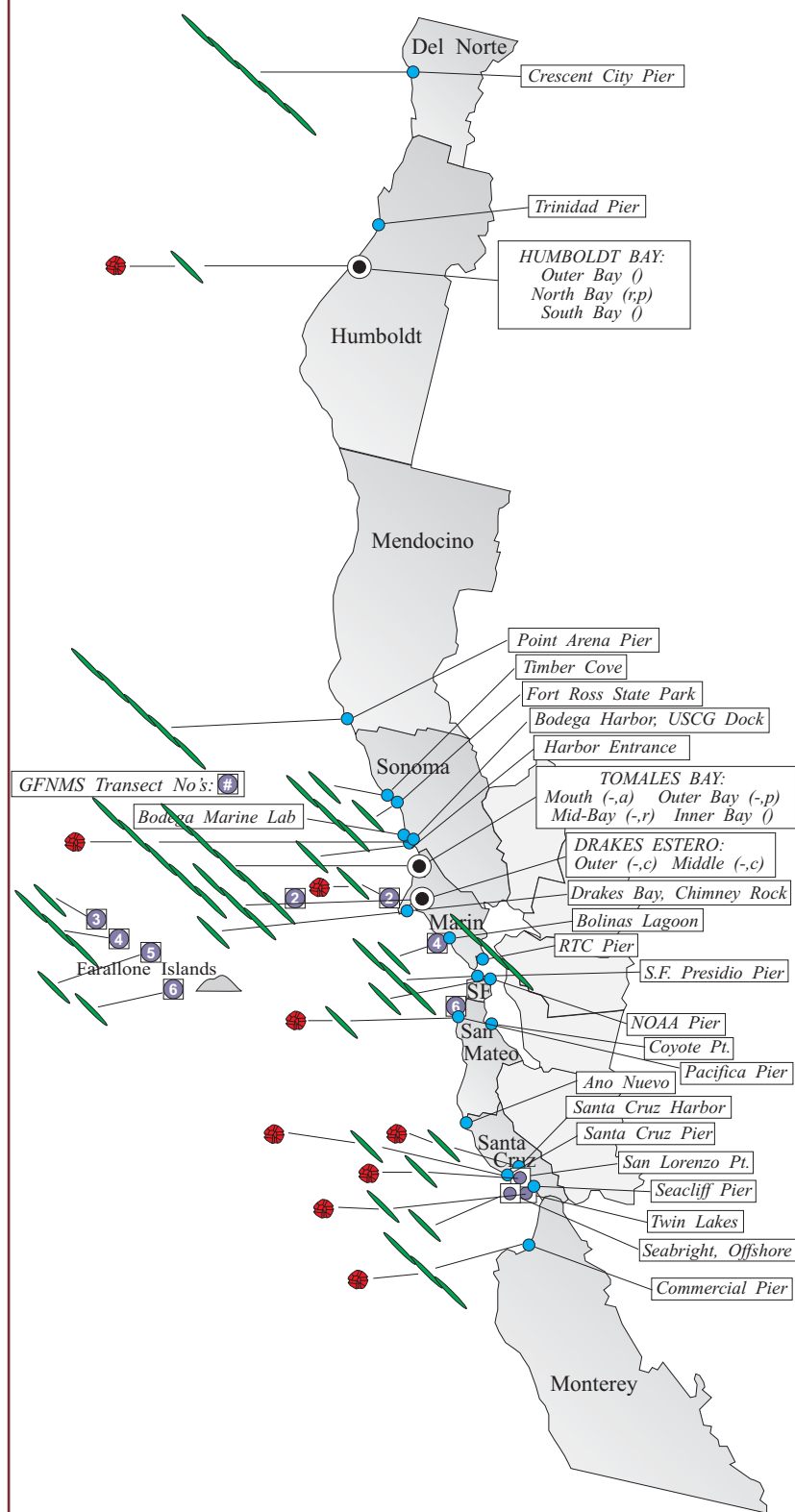


Figure 2. Distribution of toxin-producing phytoplankton in Northern California during September, 2011.



(Continued from Page 1)

(Figure 1). The relative abundance of *Pseudo-nitzschia* decreased at many locations compared to observations in August but remained prevalent between San Luis Obispo and Santa Barbara counties. There was an increase in this diatom at sites in southern San Diego County. The highest relative abundances were observed at sites inside Morro Bay (San Luis Obispo County) during the latter half of the month.

A low level of domoic acid persisted in shellfish from the aquaculture lease offshore of Santa Barbara through the first week of September, then declined below the detection limit for the remainder of the month (Figure 3). By the end of the month a low concentration of this toxin was detected in sentinel mussels in outer Morro Bay. Rock crab near Santa Cruz Island contained low levels of domoic acid in the viscera, while spiny lobster from Catalina and San Clemente islands did not contain this toxin.

Non-toxic Species

Diatoms dominated the phytoplankton assemblage between San Luis Obispo and Los Angeles. *Chaetoceros* was ubiquitous and *Eucampia* was common at a number of locations.

Northern California Summary:

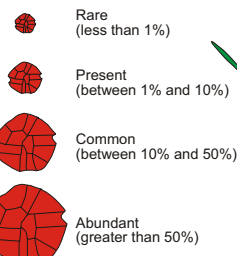
Paralytic Shellfish Poisoning

Alexandrium was observed in low numbers

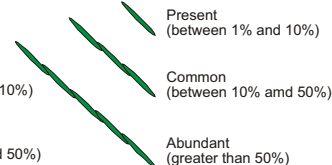
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Relative Abundance of Known Toxin Producers

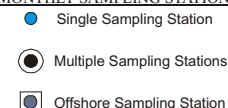
Alexandrium Species



Pseudo-nitzschia Species



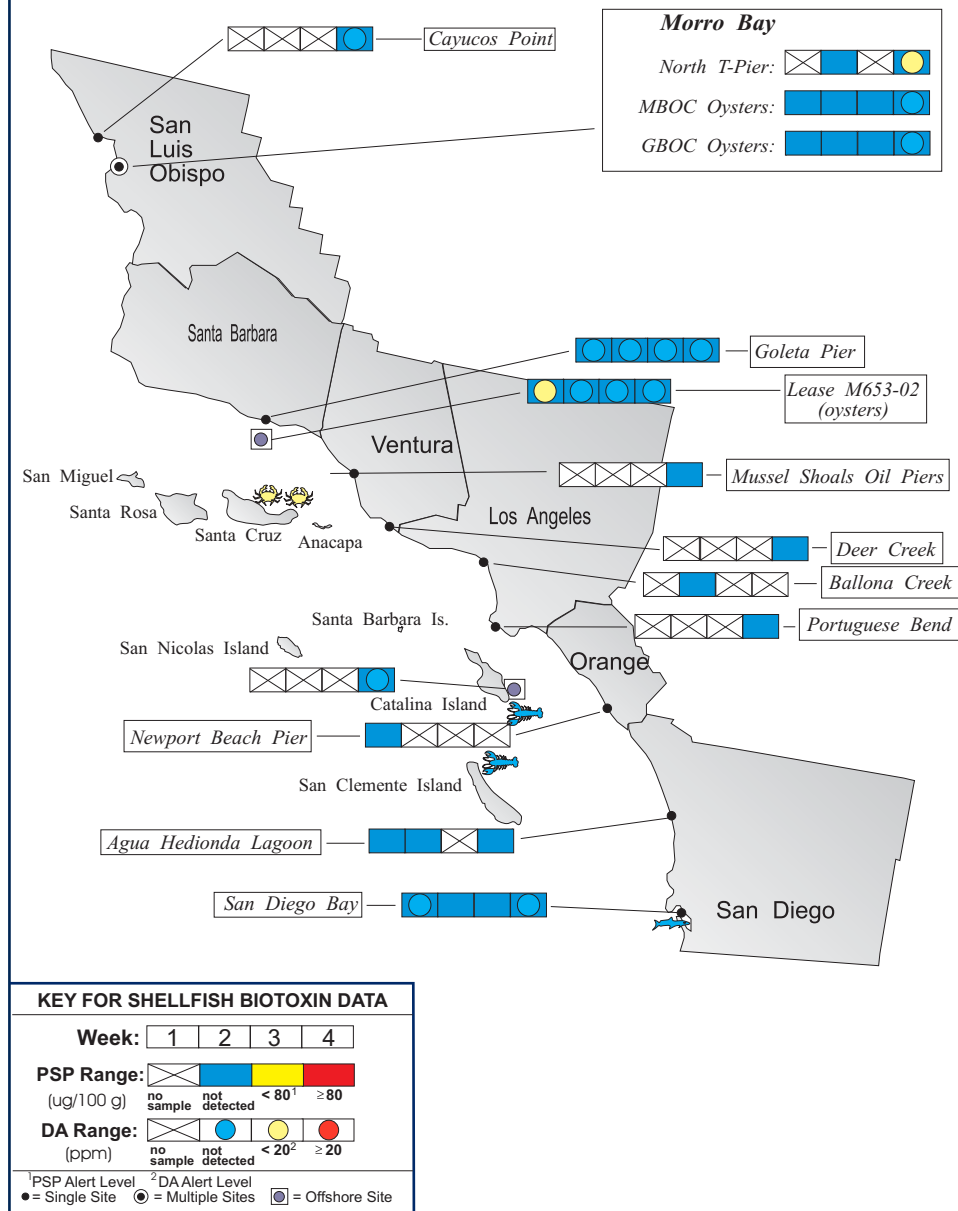
MONTHLY SAMPLING STATIONS:



For areas with multiple sampling stations, species abundance at each station is represented as follows:

(A,P) = Abundance for *Alexandrium* and *Pseudo-nitzschia*.
e.g., (c,p) = common, present; (a,-) = abundant, not observed

Figure 3. Distribution of shellfish biotoxins in Southern California during September, 2011.



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from numerous sites between Monterey and Sonoma counties, as well as inside Humboldt Bay during September (Figure 2). The distribution of this dinoflagellate was similar to observations in August but the frequency of occurrence was greater.

Low levels of PSP toxins were detected in sentinel mussels from outer Humboldt Bay during the first week of the month and farther inside the bay by the second week (Figure 4). The toxin concentration increased above the alert level in the outer bay by September 19, then declined the following week. Oysters from the commercial shellfish beds did not contain detectable levels of the PSP toxins. Low concentrations of these toxins were also detected in shellfish from sites in San Mateo and Santa Cruz counties. Sentinel mussels at the Santa Cruz Pier contained low levels of the PSP toxins throughout the month.

Domoic Acid

Pseudo-nitzschia was observed at most sites along the northern California coast during September (Figure 2). The relative abundance of this diatom was lower than observed in August for the regions between San Francisco and Monterey. In contrast there was an increase in the relative abundance of *Pseudo-nitzschia* at sites in

(Continued on Page 4)

The Marine Biotoxin Monitoring and Control Program, managed by the California Department of Public Health, is a state-wide effort involving a consortium of volunteer participants. The shellfish sampling and analysis element of this program is intended to provide an early warning of shellfish toxicity by routinely assessing coastal resources for the presence of paralytic shellfish poisoning (PSP) toxins and domoic acid.

The Phytoplankton Monitoring Program is a state-wide effort designed to detect toxin producing species of phytoplankton in ocean water before they impact the public. The phytoplankton monitoring and observation effort can provide an advanced warning of a potential toxic bloom, allowing us to focus sampling efforts in the affected area before California's valuable shellfish resources or the public health is threatened.

For More Information Please Call:
(510) 412-4635

For Recorded Biotoxin Information Call:
(800) 553-4133

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Sonoma, Mendocino, and Del Norte counties. The highest relative abundances were observed inside Bodega Harbor (September 10), at the Pt. Arena Pier (September 6), and at the Crescent City B Street pier (September 6).

Domoic acid was not detected in any shellfish samples analyzed in September (Figure 4).

Red Tide Update

The massive August bloom of *Gonyaulax spinifera* along the Sonoma coast subsided, only to be replaced by another red tide of the nontoxic dinoflagellate *Ceratium divaricatum*. This dinoflagellate was common to abundant between San Mateo and Sonoma counties by the end of the month. Diatoms were also common, in particularly *Skeletonema* in Humboldt and Del Norte counties and *Thalassiothrix* between San Mateo and Marin counties. The latter diatom was also observed in high numbers in offshore samples collected by the Applied California Current Ecosystem Studies partnership (ACCESS; www.accessoceans.org) throughout this range. *Chaetoceros* was common inside Monterey Bay and *C. divaricatum* was common offshore of Twin Lakes State Beach.



QUARANTINES:

The October 16 health advisory remained in effect, warning consumers not to eat sport-harvested shellfish or the internal organs of crustaceans and small finfish from the Channel Islands. Elevated levels of domoic acid continued to be detected in the viscera of lobster in this region and subsequently in rock crab viscera.

The 2011 annual mussel quarantine is in

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Figure 4. Distribution of shellfish biotoxins in Northern California during September, 2011.

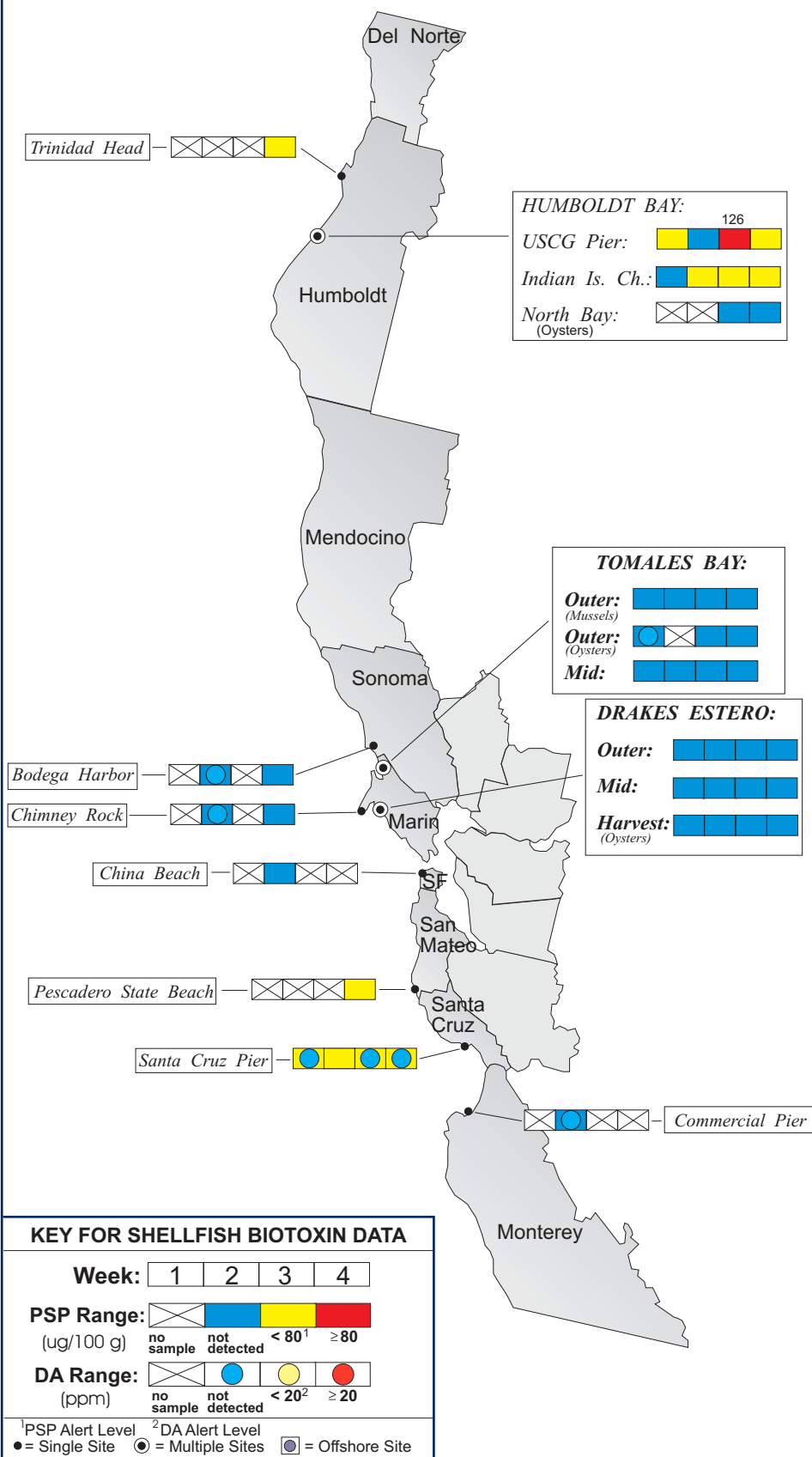


Table 1. California Marine Biotoxin Monitoring Program participants submitting shellfish samples during September, 2011.

COUNTY	AGENCY	#
Del Norte	None Submitted	
Humboldt	Coast Seafood Company	13
	Humboldt County Environmental Health Department	1
Mendocino	None Submitted	
Sonoma	CDPH Marine Biotoxin Program	2
Marin	Cove Mussel Company	4
	Drakes Bay Oyster Company	16
	Hog Island Oyster Company	5
	Marin Oyster Company	3
	CDPH Marine Biotoxin Program	2
San Francisco	San Francisco Health Department	1
San Mateo	San Mateo County Environmental Health Department	1
Santa Cruz	U.C. Santa Cruz	4
Monterey	Monterey Abalone Company	1
San Luis Obispo	Grassy Bar Oyster Co.	7
	Morro Bay Oyster Company	4
	CDPH Volunteer (<i>Otto Schmidt</i>)	1
Santa Barbara	Santa Barbara Mariculture Company	12
	U.C. Santa Barbara	4
Ventura	Ventura County Environmental Health Department	2
Los Angeles	Los Angeles County Health Department	2
	CDPH Volunteer (<i>Cal Parsons</i>)	1
	California Department of Fish and Game (<i>SB office</i>)	2
Orange	Orange County Health Care Agency	1
San Diego	Carlsbad Aquafarms, Inc.	3
	U.S. Navy Marine Mammal Program	4

Persons taking scallops or clams, with the exception of razor clams, are advised to remove and discard the dark parts (i.e., the digestive organs or viscera). Razor clams (*Siliqua patula*) are an exception to this general guidance due to their ability to concentrate and retain domoic acid in the edible white meat as well as in the viscera.

PSP toxins affect the human central nervous system, producing a tingling around the mouth and fingertips within a few minutes to a few hours after eating toxic shellfish. These symptoms typically are followed by disturbed balance, lack of muscular coordination, slurred speech and difficulty swallowing. In severe poisonings, complete muscular paralysis and death from asphyxiation can occur.

Symptoms of domoic acid poisoning can occur within 30 minutes to 24 hours after eating toxic seafood. In mild cases, symptoms of exposure to this nerve toxin may include vomiting, diarrhea, abdominal cramps, headache and dizziness. These symptoms disappear completely within several days. In severe cases, the victim may experience excessive bronchial secretions, difficulty breathing, confusion, disorientation, cardiovascular instability, seizures, permanent loss of short-term memory, coma and death.

Any person experiencing any of these symptoms should seek immediate medical care. Consumers are also advised that neither cooking or freezing eliminates domoic acid or the PSP toxins from the shellfish tissue. These toxins may also accumulate in the viscera of other seafood species such as crab, lobster, and small finfish like sardines and anchovies, therefore these tissues should not be consumed. Contact the "Biotoxin Information Line" at 1-800-553-4133 for a current update on marine biotoxin activity prior to gathering and consuming shellfish.

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effect. This quarantine prohibits the sport-harvesting of mussels along the entire California coastline, including all bays and estuaries. The annual quarantine does not apply to the certified commercial shellfish growing areas in California, which are monitored intensively throughout the year. In addition, routine coastal phytoplankton and biotoxin monitoring is maintained throughout the

quarantine period. Special quarantines or health advisories may be issued for additional seafood species as warranted by increasing toxin levels.

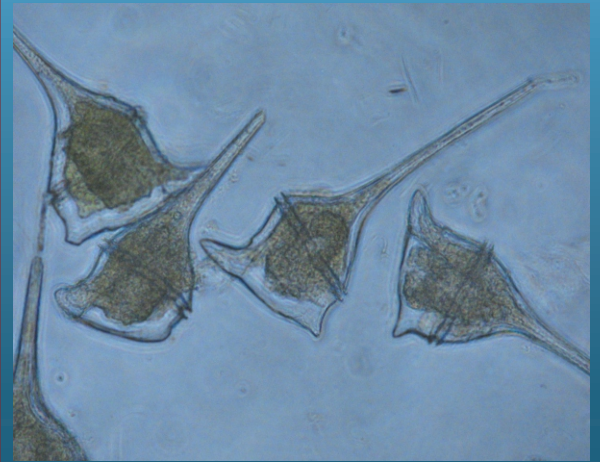
Consumers of Washington clams, also known as butter clams (*Saxidomus nuttalli*), are cautioned to eat only the white meat. Washington clams can concentrate the PSP toxins in the viscera and in the dark parts of the siphon and can remain toxic for a long period of time.

Table 2. Agencies, organizations and volunteers participating in marine phytoplankton sample collection during September, 2011.

COUNTY	AGENCY	#
Del Norte	Del Norte County Health Department	2
Humboldt	Coast Seafood Company	4
Mendocino	CDPH Volunteer (<i>Marie de Santis</i>)	3
Sonoma	CDPH Marine Biotoxin Program	2
	California Department of Fish and Game	5
	CDPH Volunteer (<i>Cathleen Cannon</i>)	1
Marin	Drakes Bay Oyster Company	11
	CDPH Volunteer (<i>Brent Anderson</i>)	2
	CDPH Marine Biotoxin Program	6
	Gulf of the Farallones National Marine Sanctuary	10
	SFSU, Romberg Tiburon Center	4
Contra Costa	None Submitted	
Alameda	None Submitted	
San Francisco	CDPH Volunteer (<i>Eugenia McNaughton</i>)	4
	Exploratorium	3
	Gulf of the Farallones National Marine Sanctuary	4
San Mateo	San Mateo County Environmental Health Department	1
	Friends of the Sea Otter (<i>Diane Larsen</i>)	1
	The Marine Mammal Center (<i>Stan Jensen</i>)	4
	U.C. Santa Cruz	1
Santa Cruz	California Department of Parks and Recreation	5
	U.C. Santa Cruz	4
Monterey	Monterey Abalone Company	3
San Luis Obispo	Friends of the Sea Otter (<i>Kelly Cherry</i>)	8
	Grassy Bar Oyster Company	4
	Morro Bay National Estuary Program	2
	Monterey Bay National Marine Sanctuary	4
	Tenera Environmental	3
	The Marine Mammal Center (<i>P.J. Webb, Tim Lytsell</i>)	4
Santa Barbara	CDPH Volunteer (<i>Sylvia Short</i>)	4
	Santa Barbara Mariculture Company	6
	Sea Grant Extension Volunteer (<i>Jonathan Gonzales</i>)	1
	U.C. Santa Barbara	4
Ventura	CDPH Volunteer (<i>Fred Burgess</i>)	2
	National Park Service	2

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PHYTOPLANKTON GALLERY



The dinoflagellate *Ceratium divaricatum* created red tides along parts of the northern California coast.



The diatom *Thalassiothrix* was abundant offshore of San Francisco and Marin counties..



The dinoflagellate *Noctiluca*, usually round in shape, is distended as it engulfs a chain of *Pseudo-nitzschia*.

A Look Back: Alexandrium and PSP Toxicity during September 2006

Northern California Summary:

Paralytic Shellfish Poisoning

Alexandrium was observed along most of the northern California coast during September 2006, with the greatest number observed at sites between Sonoma and Monterey counties. The highest relative abundance of *Alexandrium* occurred in mid Tomales Bay (September 2).

Low levels of PSP toxins were detected throughout September 2006 in Drakes Estero and Tomales Bay. There was a brief increase in toxicity above the alert level in sentinel mussels from Drakes Estero on September 12 (100 ug), declining below the alert level the following week. Low concentrations of PSP toxins were also detected at two sites inside Humboldt Bay.

Southern California Summary:

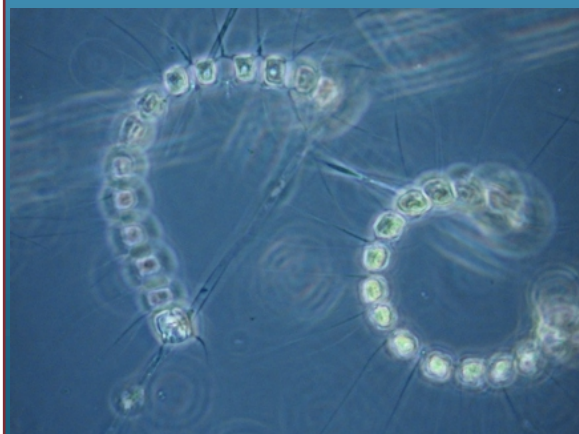
Paralytic Shellfish Poisoning

Alexandrium was observed at sites between San Luis Obispo and San Diego counties during September 2006. More frequent observations were most notable at offshore sites along the San Luis Obispo coast. The highest cell numbers were observed at Pismo Beach Pier on September 27. This marked the seventh consecutive month that *Alexandrium* had been observed along a significant portion of the Southern California coast.

PSP toxins were detected by the second week of September in shellfish samples from San Luis Obispo County. By the third week toxic concentrations reached 164 ug/100 g shellfish tissue inside Morro Bay. These high levels persisted through the last week of the month (141 ug/100 g). High toxin levels were also detected in mussels from Vandenberg on September 26 (148 ug).

PHYTOPLANKTON GALLERY

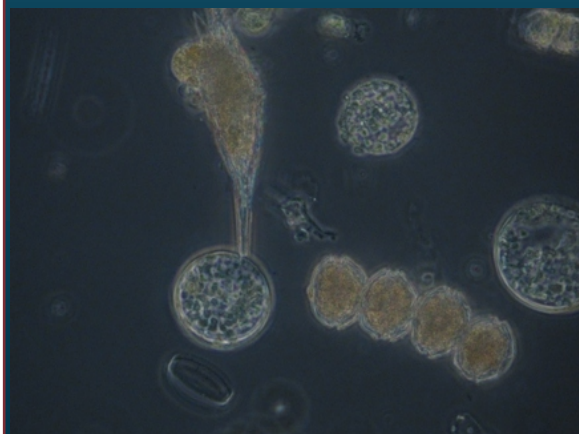
September 2006 Observations



The diatom *Chaetoceros* remained common along most of the California coast in September 2006.



The athecate dinoflagellate *Cochlodinium* was linked with mass mortalities of shellfish and other sessile invertebrates along the California coast.



The chain-forming dinoflagellate *Alexandrium*, responsible for the PSP toxins, was present at a number of sites in September 2006.

Table 2 continued (from Page 6).

COUNTY	AGENCY	#
Los Angeles	Los Angeles County Sanitation District	2
	Catalina Island Martine Institute	4
	CDPH Volunteer (<i>Cal Parsons</i>)	2
	Los Angeles County Health Department	2
	Southern California Marine Institute	1
	Tole Mour	5
Orange	Orange County Health Care Agency	2
	Ocean Institute	1
San Diego	Carlsbad Aquafarms, Inc.	3
	Scripps Institute of Oceanography	4
	Tijuana River National Estuary Research Reserve	2
	U.S. Navy Marine Mammal Program	4